

**PERENCANAAN CAMPURAN BETON KEKUATAN AWAL TINGGI  
(HIGH EARLY STRENGTH CONCRETE) DENGAN BAHAN TAMBAH  
SUPERPLASTICIZER TIPE POLYCARBOXYLATE ETHERS**

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**ABSTRAK**

Saat ini pengembangan terbaru *Superplasticizer* yang berbahan dasar *polycarboxylate* telah secara luas digunakan dalam pekerjaan beton khususnya pada produk beton pracetak karena bisa mempercepat proses hidrasi pada beton sehingga didapat nilai kekuatan awal beton tinggi dengan acuan umur beton dalam hari bahkan dalam jam.

Penelitian ini dilakukan untuk memberikan pengetahuan mengenai kelebihan perencanaan campuran beton (mix desain) dengan menambahkan *Superplasticizer* tipe *polycarboxylate ethers* (*PCE*) jika dibandingkan dengan mix desain beton normal di lihat dari sisi kelecakan, kuat tekan beton dan analisis biaya yang timbul. Sampel kubus ukuran 15 cm x 15 cm x 15 cm, terdiri dari benda uji beton normal (BN) dan Benda uji penambahan *superplasticizer PCE* 1% dengan perkiraan reduksi air masing-masing 35% ( $B_{TC}$  Ra-35%), 40% ( $B_{TC}$  Ra-40%), 45% ( $B_{TC}$  Ra-45%) dan 50% ( $B_{TC}$  Ra-50%). masing-masing variasi terdiri dari 3 sampel yang akan diuji pada umur 6 jam dan 7, 14, 21, 28 hari sehingga total benda uji sebanyak 75 buah. Kuat tekan beton rencana ( $f'c$ ) pada umur 28 hari ialah 50 Mpa.

Hasil pengujian menunjukkan penambahan *Superplasticizer* tipe *polycarboxylate ethers* (*PCE*) sebesar 1% dapat menambah nilai kelecakan dan kuat tekan jika dibandingkan dengan beton normal (BN) tanpa campuran *Superplasticizer* tipe *polycarboxylate ethers* (*PCE*). Hasil uji nilai slump rata-rata beton normal (BN) : 1.3 cm, ( $B_{TC}$  Ra-35%) : 18.5 cm, ( $B_{TC}$  Ra-40%) : 22.8 cm. Hasil pengujian kuat tekan beton rata-rata yang telah di konversi ke benda uji silinder pada umur 28 hari beton normal (BN) : 55.636 Mpa, ( $B_{TC}$  Ra-35%) : 62.386 Mpa, ( $B_{TC}$  Ra-40%) : 63.03 Mpa. Jika dilihat dari sisi ekonomis pemakaian *PCE* 1% berdampak pada pengurangan semen sehingga muncul penghematan masing-masing ( $B_{TC}$  Ra-35%) sebesar  $\pm$  18,87% ; ( $B_{TC}$  Ra-40%) sebesar  $\pm$  23,61% jika dibandingkan dengan harga campuran beton normal (BN). Tetap nilai workability yang terlalu tinggi pada campuran beton *PCE* 1% dengan FAS 0.31 ada resiko terjadi peristiwanya *bleeding* dan segregasi.

Kata kunci : Beton kekuatan awal tinggi, *polycarboxylate ethers*, *superplasticizer*.

# THE PLAN OF HIGH EARLY STRENGTH CONCRETE WITH THE ADDITIONAL MATERIAL OF SUPERPLASTICIZER, POLYCARBOXYLATE ETHERS TYPE

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## ABSTRACT

Nowadays, the new development of Superplasticizer with the basic material of polycarboxylate has been used widely in the concrete work especially for the concrete precast product, because it can accelerate the hydration process, so that there is the value of high early strength concrete with the reference of concrete in some days, moreover in some hours.

This research is used to give knowledge about the benefit of the plan of mixed concrete design by adding Superplasticizerpolycarboxylate ethers type (PCE), if it is compared with the normal mixed concrete design seen from the muddy side, the strong pressure of concrete, and the analysis of the cost which appeared. Sample of cube with the measure of 15 cm x 15 cm x 15 cm contains of the tested thing of the normal concrete (BN) and the tested thing of the additional Superplasticizer PCE 1 % with the approximation of each water reduction 35 % ( $B_{TC}$  Ra-35 %), 40 % ( $B_{TC}$  Ra-40 %), 45 % ( $B_{TC}$  Ra-45 %) and 50 % ( $B_{TC}$  Ra-50 %). Each variation contains of 3 samples which will be tested at the age of 6 hours and 7, 14, 21, 28 days, so that the total of the tested thing are 75. The strong pressures of planned concrete ( $f'c$ ) at the age of 28 days are 50 Mpa.

The result of the test which shows the increasing of Superplasticizerpolycarboxylate ethers type (PCE) with the number of 1 % can increase the value of the muddy and the strong pressure if it is compared with the normal concrete (BN) without mixed Superplasticizerpolycarboxylate ethers type (PCE). The result of the slumped average value test of normal concrete (BN): ( $B_{TC}$  Ra-35%): 18.5 cm, ( $B_{TC}$  Ra-40%): 22.8 cm. The result of the strong pressure of concrete average test which had been converted to the tested cylinder at the age of 28 days of the normal concrete (BN): 55.636 Mpa, ( $B_{TC}$  Ra-35%): 62.386 Mpa, ( $B_{TC}$  Ra-40%): 63.03 Mpa. If it is seen from the economical use side PCE 1 %, it will impact to the lack of sand, so that there is each saving ( $B_{TC}$  Ra-35%) at the number of  $\pm$  18,87 %; ( $B_{TC}$  Ra-40%) at the number of  $\pm$  23,61 % if it is compared with the cost of the mixed normal concrete (BN). But, the value of

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workability which is very high for the mixed normal concrete PCE 1 % with FAS 0.31 will consist of bleeding event and segregation.

**Keywords:**High early strength concrete, polycarboxylate ethers, superplasticizer.



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